Nelson Forest Region	**Natural Regeneration under Partially Cut Stands in the ICH Zone** **by** **D.L. Delong and G. Butt**	
	Research Summary 014	

INTRODUCTION

It is important to understand the potential contribution that natural regeneration can make to forest renewal given the increased reliance on partial cutting systems. However, little is known about natural regeneration following partial cutting in the Interior Cedar Hemlock (ICH) zone of the southeastern interior of British Columbia.

In 1989 a retrospective study was completed in the ICHmw2 and ICHdw subzones of the Arrow and Kootenay Lake Forest Districts (Butt and Bancroft 1990). In 1992, a similar study was completed in the ICHmw1 and ICHmk1 subzones in the Golden Forest District (DeLong 1994).

The objectives of these studies were to document the success of regeneration, beneath a range of residual overstories. The findings of these studies have increased our knowledge of natural regeneration in partial cuts and will help develop silvicultural strategies.

METHODS

With the help of district staff, sites for both studies were selected from a range of openings.

For Butt and Bancroft's (1990) study, sites were selected from the ICHmw2 and ICHdw subzones of the Arrow and Kootenay Lake Forest Districts. A total of 40 openings were sampled. Each opening met the following criteria:

- partially cut (between 20 and 80 % basal area removed);
- harvested at least six years prior to data collection;
- stands had circum mesic moisture regime;
- the opening was at least five ha.

For DeLong's (1994) study, sites were selected from the ICHmw1 and ICHmk1 subzones of the Golden Forest District (Figure 1). The same general selection criteria were used. However, to sample blocks with more accurate history record information, an upper limit of 15 years since harvest was set. Because of this restriction, only 10 sites were sampled.

The majority of the openings sampled in both studies were a form of diameter limit cut, or salvage cut with few prescriptions specifically designed for regeneration.

RESULTS

Regeneration

An average of 10 000 stems/ha were found on the majority of the openings sampled in both studies (Figure 2). The vast majority (90%) of these stems were new, or established after harvest. Advance regeneration was not actively protected during harvesting on any of the openings sampled, but surviving stems were often judged acceptable at the time of survey.

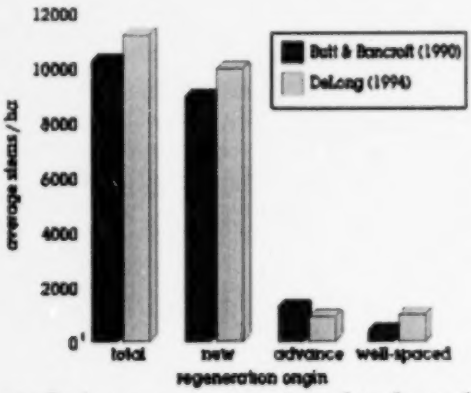

Figure 2. *Average regeneration abundance from Butt and Bancroft (1990) and DeLong (1994).*

Butt and Bancroft (1990) found that aspect was the most important variable contributing to regeneration success. North aspects contained more abundant regeneration than south aspects. However, aspect did not appear to effect regeneration abundance in the ICHmk1 and ICHmw1 (DeLong 1994). All of the openings sampled were relatively flat which lessens the effect of aspect. On these sites, time since harvest was the most important variable (eg., the older the opening, the more regeneration there was).

On sites in the ICHmw2 and particularly in the ICHdw, brush cover appeared to inhibit regeneration establishment. These results were influenced by the inclusion of several sites in the Pend Oreille (ICHdw) area, in which canopy opening had stimulated a dense cover of ninebark, ocean spray, and hazel nut. On the sites in the ICHmw1 and ICHmk1, brush cover did not appear to have an effect on regeneration abundance. This was attributed to the relatively low amounts of vegetation (50 to 80% cover, less than 1 meter high).

Species composition of the regeneration reflected that of the overstory in all subzones, with two exceptions. Western larch was virtually absent in the understory of all plots in the ICHmw2 and ICHdw (not surprising given its low shade tolerance). Western white pine seedlings were commonly found in stands lacking this species in the overstory. This may be due to seed banking.

Residual overstory

Prolonged retention of the residual overstory (and increasing basal area) appeared to have a negative effect on seedling growth. In some cases, growth of the new regeneration was slow and failed to meet the height requirements to be considered acceptable. Standard regeneration survey methodology developed for clearcuts was used in both studies. New criteria may be required for partial cuts, particularly where overstories are left in perpetuity.

Residual basal area was poorly correlated with natural regeneration abundance in both studies. Literature from the Pacific Northwest indicates that shelter is a requirement for successful regeneration on sites that have severe moisture deficits (such as steep, south aspects) during the growing season. In the ICH where moisture deficits are less likely, a residual basal area (shelter) may not be a requirement for successful regeneration on most sites. Prescribed residual basal areas will likely be more a function of objectives for seed supply, aesthetics and/or wildlife habitat.

Although inconclusive, some sites in the ICHmk1 may benefit from a residual overstory as protection from frost. There may be some benefit of retaining a certain level of residual overstory to control brush development on some sites in the ICHdw.

Incidence of logging damage and blowdown was generally low. Logging damage seemed to be higher on sites with greater slope gradients.

SUMMARY

The results of these studies have made a contribution to our understanding of natural regeneration under partially cut stands. Although more research is needed, some important observations can be summarized to help foresters prescribing partial cutting in these ICH subzones:

- we can expect greater stocking of post-harvest naturals on cool, moist, north facing sites;
- prolonged retention of the residual overstory will have a negative effect on seedling growth;
- advance regeneration should be considered more often;
- on sites in the ICH, prescribed residual basal area levels will be more a function of objectives for seed supply, aesthetics and/or wildlife habitat than shelter. Exceptions may include frost prone areas, steep south facing slopes or sites where opening up the canopy leads to expansion of brush cover;
- new silviculture survey criteria are required for partially cut stands.

REFERENCES

Butt, G. and B. Bancroft. 1990. Natural regeneration under partially cut Douglas-fir stands and mixed conifer stands in the Nelson Forest Region. Final Report, Nelson, B.C. FRDA 3.66.

DeLong, D.L. 1994. A retrospective investigation of partial cuts in the ICHmw1 and ICHmk1 in the Golden Forest District. Forest Sciences Section, Nelson, B.C. Technical Report TR-005.

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